1 Introduction

This report presents the results of the Supplemental Remedial Investigation (Supplemental RI), conducted between November 2001 and February 2002, for The Burlington Northern and Santa Fe Railway Company's (BNSF's) Former Maintenance and Fueling Facility in Skykomish, Washington. The location of the Supplemental RI fieldwork, shown on Figure 1-1, includes the former maintenance, fueling facility, and adjacent properties that Ecology believes may have been affected by releases from the BNSF facility.

In 1993, BNSF entered into an Agreed Order (No. DE91TC-N213) with the Washington State Department of Ecology (Ecology) to conduct a Remedial Investigation and Feasibility Study (RI/FS) and to implement certain interim cleanup actions such as dust control and oil recovery wells and booms (1993 Agreed Order). BNSF and Ecology entered into a second Agreed Order (No. DE 01TCPNR-2800) in 2001 under which BNSF is implementing additional interim actions such as a subsurface barrier wall and enhanced oil recovery system (2001 Agreed Order).

This document is submitted to Ecology by the RETEC Group, Inc. (RETEC) on behalf of BNSF as the Supplemental Remedial Investigation Report for the former maintenance and fueling facility. This Supplemental RI has been conducted in accordance with Section IV.1 of the 1993 Agreed Order and the Supplemental RI/FS Work Plan (November 13, 2001) approved by Ecology. This Supplemental RI complies with Washington Administrative Code (WAC) 173-340-350, and is intended to fill the data gaps identified since the 1996 Draft RI Report (RETEC, 1996a), thus completing site characterization and RI requirements of the 1993 Agreed Order. The Supplemental RI was conducted in accordance with methods and procedures for sample collection and data analysis in the Work Plan and the *Sampling and Analysis Plan (SAP) for the BNRR Maintenance and Fueling Facility, Skykomish, Washington* (RETEC, 1993).

This Supplemental RI Report, together with the 1996 Draft RI Report, constitutes a two-volume document for the complete Remedial Investigation in accordance with the 1993 Agreed Order and WAC 173-340-350(7). The 1996 Draft RI Report constitutes Volume 1 of the Remedial Investigation and remains in its current form for public review. This Supplemental RI Report constitutes Volume 2 of the Remedial Investigation. This Supplemental RI Report (Volume 2) provides a description of field methods employed for investigation work, describes the conditions encountered, and provides results of analytical testing conducted since the Supplemental RI/FS Work Plan was approved. Furthermore, this document integrates the analytical results of the Supplemental RI work with the work described in the 1996 Draft RI (Volume 1) to present a complete data set. This document presents conclusions based on this complete data set to characterize the nature and extent of

contamination associated with BNSF's former maintenance and fueling facility.

The site background and description are provided below, followed by the scope of the Supplemental RI, and the report organization.

1.1 Background

Early environmental investigations were conducted between 1973 and initiation of the RI process in 1993, the findings of which are described in the 1996 Draft RI Report (RETEC, 1996a). The results of the initial RI investigations, conducted between 1993 and 1995 under the 1993 Agreed Order, are presented in the 1996 Draft RI Report (RETEC, 1996a), the first comprehensive environmental investigation of the former maintenance and fueling facility. The initial RI work was conducted in accordance with the *Burlington Northern Railroad Remedial Investigation/Feasibility Study Work Plan, Skykomish, Washington* (RI/FS Work Plan) (GeoEngineers, 1993) and the detailed field activities plan entitled *Sampling and Analysis Plan for the BNRR Maintenance and Fueling Facility, Skykomish, Washington* (RETEC, 1993) (SAP). The RI/FS Work Plan and SAP were approved by Ecology under the 1993 Agreed Order. The Supplemental RI fieldwork is intended to fill data gaps identified since the Draft RI Report was submitted and this Supplemental RI Report completes the Remedial Investigation requirements for the site.

In October 1995, following completion of the initial RI field activities, an interim action product recovery system, consisting of four recovery wells, was installed immediately adjacent to the Skykomish River under the 1993 Agreed Order. This system became fully operational in February 1996. Water level monitoring, groundwater sampling, and product recovery monitoring have been conducted around the recovery system since startup. In addition, several focused investigations have been conducted to address specific concerns of Ecology and local residents since submittal of the Draft RI Report. These additional investigations included: (1) completion of step-out borings and borings for culvert installation (1995 and 1996); (2) blood-lead testing at Skykomish School by the Health Department (1996); (3) quarterly groundwater sampling, including background metals sampling (1996); (4) water supply testing by the Health Department (1996 and 1997); (5) Maloney Creek soil sampling (1997); (6) site-wide groundwater sampling, including semiannual sampling (1997 through 2001); (7) indoor air sampling (1997 through 1999); (8) soil sampling for TPH and background metals (1999); and (9) biological sediment sampling (2001). The results of these investigations are summarized in Section 2.3.

In February 2001, BNSF began developing an interim action under Ecology oversight to reduce and eventually eliminate petroleum seeps to the Skykomish River during 2001. Pursuant to the 2001 Agreed Order, BNSF

installed a subsurface barrier wall parallel to the Skykomish River to intercept oil floating on groundwater (also known as light nonaqueous-phase liquid, or LNAPL) before it reaches the river. BNSF has also, pursuant to the 2001 Order, installed an additional recovery well and several performance monitoring wells to recover LNAPL and monitor performance of the barrier system. An automated LNAPL recovery system is being evaluated and designed, and will be installed in 2002 in the last phase of the subsurface barrier wall and product recovery system interim action.

1.2 Site Description

The site is located in the Town of Skykomish, King County, Washington, and includes BNSF property and surrounding areas affected by the former maintenance and fueling facility. The BNSF property boundary and the Supplemental RI study area are shown on Figure 1-2. Railroad Avenue separates BNSF's property from the main commercial district of the town. Maloney Creek passes through the southern portion of the BNSF property and adjacent outside rail yard area and flows northwest into the South Fork of the Skykomish River. The Supplemental RI study area encompasses an area of approximately 40 acres.

The BNSF facility was historically used to fuel and maintain locomotives, provide electricity for electric engines, store snow removal equipment, and provide a base of operations for local track repair and maintenance. A detailed operations history of the rail yard is provided in the Draft RI Report (RETEC, 1996a) and the Draft Feasibility Study (FS) (ThermoRetec, 1999a).

The Great Northern Railroad (GNR) originally owned the rail yard. GNR owned the property from the late 1890s until 1970 when GNR merged with four other railroads and became Burlington Northern Railroad. In 1996, Burlington Northern Railroad merged with the Atchison, Topeka and Santa Fe Railroad and changed its corporate name to The Burlington Northern and Santa Fe Railway Company (BNSF). The former maintenance and fueling facility is currently owned and operated by BNSF.

Current activities at the railroad property are limited. Freight trains and Amtrak passenger trains use active tracks. Other trackage is used for storing snow removal equipment and as a base of operations for the local track repair and maintenance crew. Properties adjacent to or near the railroad property include private residences, small businesses, and public facilities property (e.g., the school, town hall, fire station, and public library).

Under the Supplemental RI/FS Work Plan, the area of investigation included both the rail yard and the adjacent community. To facilitate description and reference of the study area, Ecology divided the area clockwise into five sampling sections, labeled Sections 1 through 5, further divided Sections 1 and 2 into five subsections 1A, 1B, 1C, 2A, and 2B (Figure 1-2). Ecology

divided the study area into sampling sections for ease of discussion and to track the subareas where the agency has identified data gaps. A description of these sections follows.

Section 1: Section 1 is bounded to the north by the Skykomish River, to the west by 5th Street, and to the south by Railroad Avenue, and consists primarily of residential, commercial, and town properties. Section 1 has been divided into three subsections (A, B, and C) by 4th and 3rd Streets.

Section 2: Section 2 (immediately south of Section 1) is bounded to the north by Railroad Avenue and the BNSF property line, to the west by 5th Street, and to the south by the Old Cascade Highway. Section 2 has been divided into two subsections (A and B). Section 2A includes the majority of the rail yard and main line. Section 2B includes the former Maloney Creek channel and outside the rail yard between the rail yard and the Old Cascade Highway, east of 5th Street.

Section 3: Section 3 is primarily residential and located south of the Old Cascade Highway and west of 5th Street.

Section 4: Section 4 includes the BNSF rail yard property south of the main tracks, and the residences immediately south of BNSF property, west of 5th Street and north of the Old Cascade Highway.

Section 5: Section 5 includes part of the rail yard and residential, town, school, and commercial properties. It is bounded to the north by the Skykomish River, to the east by 5th Street, and extends just south of the main track line on BNSF property.

1.3 Purpose and Scope of the Supplemental RI

The purpose of the Supplemental RI is to fill identified data gaps and complete the assessment of the nature and extent of contaminants in soil, groundwater, sediment and surface water at the BNSF Skykomish site in Washington State. This Supplemental RI Report presents all data that have been collected since the preparation of the Draft RI Report (RETEC, 1996a). All prior data, including those reported in the Draft FS (ThermoRetec, 1999a, Appendix A), Monthly Progress Reports, and other individual reports, are also presented in this Supplemental RI Report to provide a complete data set and meet the objectives of the Supplemental RI, as described in the Supplemental RI/FS Work Plan (RETEC, 2001a).

1.3.1 RI and Supplemental RI Objectives

The overall objectives of the RI are:

- To characterize the nature and extent of contamination resulting from the former maintenance and fueling activities and to characterize current conditions, and;
- To provide sufficient data and other information to prepare a feasibility study.

Large amounts of data have already been collected during the initial RI fieldwork and in subsequent, pre-Supplemental RI investigations. The Supplemental RI was conducted to meet the following specific objectives:

1. Assess Impacts to the Skykomish River

Pre-Supplemental RI data indicated that the Skykomish River has been impacted by petroleum seeps along the riverbank west of the 5th Street Bridge. Sediment samples were collected from the Skykomish River during the summer of 2001 to assess the extent, magnitude, and potential impacts of contamination on sediments and benthic infauna.

During the autumn of 2001, a subsurface barrier wall and recovery wells were installed to minimize migration of LNAPL into the river. The wall was located as close as possible to the river in an area that should intercept LNAPL before it impacts the river. The Supplemental RI fieldwork collected data that can be used to assess whether there may be additional impacts on the river that have not been addressed by the installation of the subsurface barrier wall and LNAPL recovery system.

2. Define Extent of LNAPL and Dissolved Plume

The Draft RI Report provides data to identify the presence and extent of LNAPL and dissolved plume impacts extending north from the rail yard to the Skykomish River. This Supplemental RI Report provides additional data to fill data gaps regarding the extent of the LNAPL and dissolved plume.

3. Investigate Former Maloney Creek Channel

There are anecdotal accounts that "PCB oil" was discharged onto the ground surrounding the former transformer pad in the rail yard and into the (now) former channel of Maloney Creek. Surface soil samples were collected from the ground surrounding the former transformer pad, and sediment samples were collected from the bed of the former channel of Maloney Creek, all of which were analyzed for PCBs and TPH.

4. Define Rail Yard Contamination

The rail yard was investigated to more precisely identify source areas for soil and groundwater contamination. During the Supplemental RI, additional soil borings and monitoring wells were installed to determine rail yard subsurface conditions.

Lead and arsenic analyses also were performed on selected soil samples. The initial RI work found that elevated lead and arsenic concentrations were present primarily within the BNSF facility boundaries, with the highest lead concentrations near the former substation, around the current maintenance building, and around railroad tracks in the eastern portion of the facility. The surface soil was systematically sampled for lead and arsenic on a grid in the vicinity of the former substation and in the area on the eastern portion of the facility within which the highest concentrations were observed during the initial RI work.

5. Define Off-Site Contamination

There have been anecdotal reports of historic oil contamination in areas that were not sampled as part of the initial RI. During the Supplemental RI, soil samples were collected from these and other areas to better define the nature and extent of soil contamination that may be associated with the former maintenance and fueling facility. In addition, wells were installed in these areas to allow for the collection of groundwater samples to further define the nature and extent of groundwater contamination that may be associated with the former maintenance and fueling facility.

There has also been concern expressed by local area residents that lead and arsenic may be present in the surface soils outside the rail yard north of the rail yard. Therefore, during the Supplemental RI, surface soil samples were collected for analysis of lead and arsenic north of the site from the neighboring properties.

Finally, there has been public concern that oil containing PCBs may have been used for dust suppression in areas of the town. Therefore, samples were collected from soil immediately underlying town roads to assess whether PCBs are present.

1.3.2 Supplemental RI Report Scope

The 1996 Draft RI Report and this Supplemental RI Report comprise a two-volume document, Volume 1 and Volume 2, respectively, for the complete RI Report. The development of the site conceptual model, based on the complete data set, will be performed as an FS task, as described in Section 4 of the Supplemental RI/FS Work Plan (RETEC, 2001a).

This Supplemental RI Report describes the sampling procedures, sample locations, and field condition of work performed in 2001 and 2002, including presenting boring and well logs, well construction details, field screening results, and other field observations. This report also presents the Supplemental RI analytical data, including data validation results and copies of all laboratory data sheets. These data are presented with data collected during the initial RI work and other subsequent pre-Supplemental RI collection events.

1.4 Report Organization

This Supplemental RI Report is organized as follows:

- Section 2 summarizes the site investigation activities conducted prior to the Supplemental RI work (initiated in November 2001).
- Section 3 provides details of the Supplemental RI field investigation including the rationale and objectives, field procedures, and methods.
- Section 4 details the data management procedures, including the data validation results for the Supplemental RI data, and a discussion of the data usability and adequacy.
- Section 5 describes the contaminant sources.
- Section 6 summarizes the physical setting, the geology, and the hydrogeology of the investigation area. Some detail was provided in the Draft RI Report (RETEC, 1996a); this section will build on the existing knowledge and provide additional detail using the more recently collected data.
- Sections 7, 8, and 9 discuss the chemical results of the soil, groundwater, and sediment investigations, respectively; the data points are presented on figures and in tables.
- Section 10 summarizes the findings of the Supplemental RI, and Section 11 provides references.